CLAIMS:

1. A Stirling engine comprising:

a displacer unit having displacer cylinders, displacers slidably arranged in the chambers of said displacer cylinders, expansion chambers and contraction chambers into which, and from which, an operation gas flows with the operation of said displacers; and

a power piston unit having a power cylinder with an operation chamber that communicates with either said expansion chamber or said contraction chamber of said displacer unit, and a power piston slidably arranged in said power cylinder;

wherein said displacer cylinders of said displacer unit are equipped with a heating wall surrounding a heat source and cooling walls forming a plurality of cylinder chambers surrounding said heating wall; and

said displacers of said displacer unit are slidably arranged in said plurality of cylinder chambers in the directions to approach said heat source and to separate away from said heat source.

2. A Stirling engine according to claim 1, wherein said heating wall of said displacer cylinders forms a flow passage through which said heat source flows.

3. A Stirling engine according to claim 2, wherein the flow passage formed by said heating wall is of a cylindrical shape.

4. A Stirling engine according to claim 1, wherein a plurality of fins are provided in the axial direction on the inner peripheral surface of said cylindrical heating wall constituting said displacer cylinders.

5. A Stirling engine according to claim 4, wherein said fins are formed in a spiral shape.

6. A Stirling engine according to claim 1, wherein a core member is arranged in the central portion of said flow passage formed by said cylindrical heating wall that constitutes said displacer cylinders over nearly the full length of said flow passage.

7. A Stirling engine according to claim 1, wherein:

said displacer unit comprises a pair of displacer cylinders arranged facing each other, and a pair of displacers slidably arranged in said pair of displacer cylinders;

said power piston unit comprises a power cylinder that communicates with either said expansion chamber or said contraction chamber of the pair of displacers, and a power piston that is slidably arranged in said power cylinder and divides it into a first operation chamber and a second operation chamber; and

said first operation chamber of said power piston unit is communicated with either said expansion chamber or said contraction chamber of said displacer unit through a first communication passage, and said second operation chamber of said power piston unit is communicated with said other expansion chamber or said contraction chamber of said displacer unit through a second communication passage.